

CLAIMS

5 What is claimed is:

1. A method for the production of a 24:1 very long chain fatty acid molecule in a plant seed cell, said plant otherwise incapable of producing seed having more than 5%
10 by weight of said very long chain fatty acid molecule, said method comprising the steps of:

growing a plant under conditions wherein said plant produces long chain fatty acyl-CoA molecules in the plant seed, in the presence of an expression product of a very
15 long chain fatty acid molecule-altering DNA sequence operably linked to regulatory elements for directing the expression of said DNA sequence such as to effect the contact between such long chain fatty acyl-CoA molecules and said expression product, and producing said very long
20 chain fatty acid molecule in said plant seed at a level above 5% by weight.

2. The method of Claim 1 wherein said very long chain fatty acid molecule is produced in said plant seed to a
25 level greater than 7% by weight.

3. The method of Claim 1 wherein said regulatory elements direct preferential expression of said DNA sequence in plant seed embryo cells.

30 4. The method of Claim 1 wherein said very long chain fatty acid molecule-altering DNA sequence is a condensing enzyme encoding sequence from *Brassica*.

35 5. The method of Claim 4 wherein said *Brassica* encoding sequence is to the CE15 class of condensing enzymes.

6. The method of Claim 4 wherein said *Brassica* encoding sequence is to the CE20 class of condensing enzymes.

5 7. The method of Claim 1 wherein said very long chain fatty acid molecule-altering DNA sequence is a condensing enzyme encoding sequence from *Arabidopsis*.

10 8. The method of Claim 1 wherein said very long chain fatty acid molecule-altering DNA sequence is a condensing enzyme encoding sequence from *Nasturtium*.

15 9. The method of Claim 1 wherein said very long chain fatty acid molecule-altering DNA sequence is a condensing enzyme encoding sequence from *Lunaria*.

10. The method of Claim 9 wherein said *Lunaria* encoding sequence is *Lunaria* 5.

20 11. The method of Claim 1 wherein said regulatory elements direct preferential expression of said DNA sequence in plant seed embryo cells.

25 12. A plant seed containing a very long chain fatty acid molecule produced in accordance with Claim 1.

13. A plant seed produced in accordance with Claim 1.

30 14. A method for decreasing the proportion of VLCFA in a plant from a given proportion of VLCFA comprising the steps of:

growing a plant under conditions wherein said plant produces VLCFA and β -ketoacyl-CoA synthase, in the presence of a β -ketoacyl-CoA-decreasing DNA sequence operably linked to regulatory elements for directing the expression of said DNA sequence in said cell, wherein said DNA sequence encodes a β -ketoacyl-CoA DNA sequence of said plant and the expression of said DNA sequence results in a decrease in the production of β -ketoacyl-CoA synthase by said plant

cell and a decrease in the proportion of VLCFA produced by said plant cell.

15 15. The method of Claim 14 wherein said regulatory elements direct the antisense transcription of said DNA sequence.

10 16. The method of Claim 14 wherein said regulatory elements direct preferential expression of said DNA sequence in plant seed embryo cells and wherein said VLCFA and said β -keto acyl-CoA is produced in plant seed.

17. A plant seed cell produced in accordance with Claim 9.

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18. A construct comprising a DNA sequence which encodes a condensing enzyme and a heterologous DNA sequence not naturally associated with said encoding sequence wherein said condensing enzyme encoding sequence is obtained by screening a DNA library prepared from an organism which is capable of producing very long chain fatty acid molecules with degenerate oligonucleotide primers selected from the group consisting of
20 CAUCAUCAUGAATTCAAGCTTAARYTNBKNTAYCAYTA,
25 CAUCAUCAUGAATTCAAGCTTAAYYTNGGNGGNATGGG,
CUACUACUACUAGGATCCGTCGACCCATNCCNCCNARRTT,
CUACUACUACUAGGATCCGTCGACSWRTTRCAYTTTRAANCC and
CUACUACUACUASWRTTRCAYTTTRAANCC.

30 19. An isolated nucleic acid sequence encoding a condensing enzyme which can be isolated according to a method comprising the step of PCR amplification utilizing primers CAUCAUCAUGAATTCAAGCTTAARYTNBKNTAYCAYTA and CUACUACUACUAGGATCCGTCGACCCATNCCNCCNARRTT.

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20. A construct comprising a nucleic sequence according to Claim 19 and a heterologous DNA sequence not naturally associated with said encoding sequence.

21. A construct according to Claim 20 wherein said heterologous DNA sequence comprises regulatory elements which direct preferential expression of said DNA sequence in plant seed embryo cells.

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22. A construct according to Claim 20 wherein said condensing enzyme encoding sequence is from *Brassica*.

10 23. A construct according to Claim 22 wherein said *Brassica* encoding sequence is to the CE15 class of condensing enzymes.

15 24. A construct according to Claim 22 wherein said *Brassica* encoding sequence is to the CE20 class of condensing enzymes.

25. A construct according to Claim 20 wherein said condensing enzyme encoding sequence is from *Arabidopsis*.

20 26. A construct according to Claim 20 wherein said condensing enzyme encoding sequence is from *Nasturtium*.

25 27. A construct according to Claim 20 wherein said condensing enzyme encoding sequence is from *Lunaria*.

28. A construct according to Claim 27 wherein said *Lunaria* encoding sequence is *Lunaria* 5.

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